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FLOOD INSURANCE STUDY

MAR 0 4 1989

VILLAGE OF NORTHPORT, MICHIGAN

LEELANAU COUNTY

MARCH 2, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 260580

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

VILLAGE OF NORTHPORT,
LEELANAU COUNTY,
MICHIGAN

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Northport, Leelanau County, Michigan, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey (USGS) (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-1823, Project Order No. 1. This study was completed in January 1987.

1.3 Coordination

On June 28, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Northport, Leelanau County, Michigan. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Northport Creek and Grand Traverse Bay was studied in detail.

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF NORTHPORT, MI
(LEELANAU CO.)

APPROXIMATE SCALE

2 0 2 4 6 MILES

VICINITY MAP

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through January 1992. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Northport.

2.2 Community Description

The Village of Northport is in northern Leelanau County in northwestern Michigan. The study area is bordered by the unincorporated areas of Leelanau County on the north, west, and south, and Grand Traverse Bay, locally known as Northport Bay, on the east. The community is served by State Routes 201 and 22, and the CSX railroad. The 1980 population of Northport was reported to be 611 (Reference 1). Northport Creek flows from west to east through the study area into Grand Traverse Bay.

2.3 Principal Flood Problems

Residents of Northport have indicated that occasional shallow flooding from the overflow of Northport Creek occurs across Rose Street; however, no flood damage has resulted. During the most severe flood, water from Northport Creek was reported to have overflowed the creek banks and flowed east along the northern side of Third Street south of Pond Street. The diverted flow caused some shallow flooding in low-lying areas within the village before rejoining the creek south of Mill Street.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Discharge estimates were developed using USGS regional regression equations (Reference 2), and the U.S. Soil Conservation Service (SCS) procedures for unit-hydrograph analysis (Reference 3). Basin characteristics for the computation were measured from topographic maps (Reference 4), SCS soil survey maps for Leelanau County (Reference 5), and Michigan quaternary geology maps (Reference 6).

Peak discharge-drainage area relationships for the 100-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR
NORTHPORT CREEK		
at mouth	4.4	280

Elevations for floods of the selected recurrence intervals of Grand Traverse Bay are shown in Table 2.

TABLE 2 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	PEAK ELEVATION (FEET NGVD) 100-YEAR
GRAND TRAVERSE BAY	
along shoreline	583.8

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

For the backwater analysis of Northport Creek, cross sections were obtained from field survey or were synthesized from adjacent surveyed sections. Structural geometry and elevations for culverts, bridges, and road sections were also obtained from the field survey.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Channel roughness coefficients (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observation of the floodplain areas. Roughness values were 0.035 for the channel and from 0.022 to 0.075 for the overbank areas.

Water-surface elevations for the 100-year flood were computed using WSPRO, a step-backwater computer program (Reference 7). The starting water-surface elevation for Northport Creek was based on the 100-year flood levels for Grand Traverse Bay taken from the "Phase II Report on Great Lakes Flood Levels, Grand Traverse Bay and Little Traverse Bay" (Reference 8).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:25000 with a contour interval of 5 meters (Reference 4).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for the Village of Northport, Michigan (Reference 9).

4.2 Floodways

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Floodways have not been shown or computed for this community. Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause an increase in the base flood elevations at any point within the community greater than the State's allowable surcharge.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average

depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Village of Northport (Reference 9).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Michigan, Washington, D.C., January 1982.

2. U.S. Department of the Interior, Geological Survey, Water Resources Investigations Report 84-4207, Statistical Models for Estimating Flow Characteristics of Michigan Streams, D.J. Holtschlag and H.M. Croskey, 1984.

3. Michigan Department of Natural Resources, SCS UD-21 Method, R.C. Sorrell, 1985.

4. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:25000, Contour Interval 5 Meters: Northport, Michigan, 1983, provisional; Northport NW, Michigan, 1983, provisional; Gills Pier, Michigan, 1983, provisional; and Omena, Michigan, 1983, provisional.

5. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Leelanau County, Michigan, 1973.

6. Michigan Department of Natural Resources, Geological Survey Division, Quaternary Geology of Michigan with Surface Water Drainage Divides, W.R. Farrand and D.L. Bell, 1984.

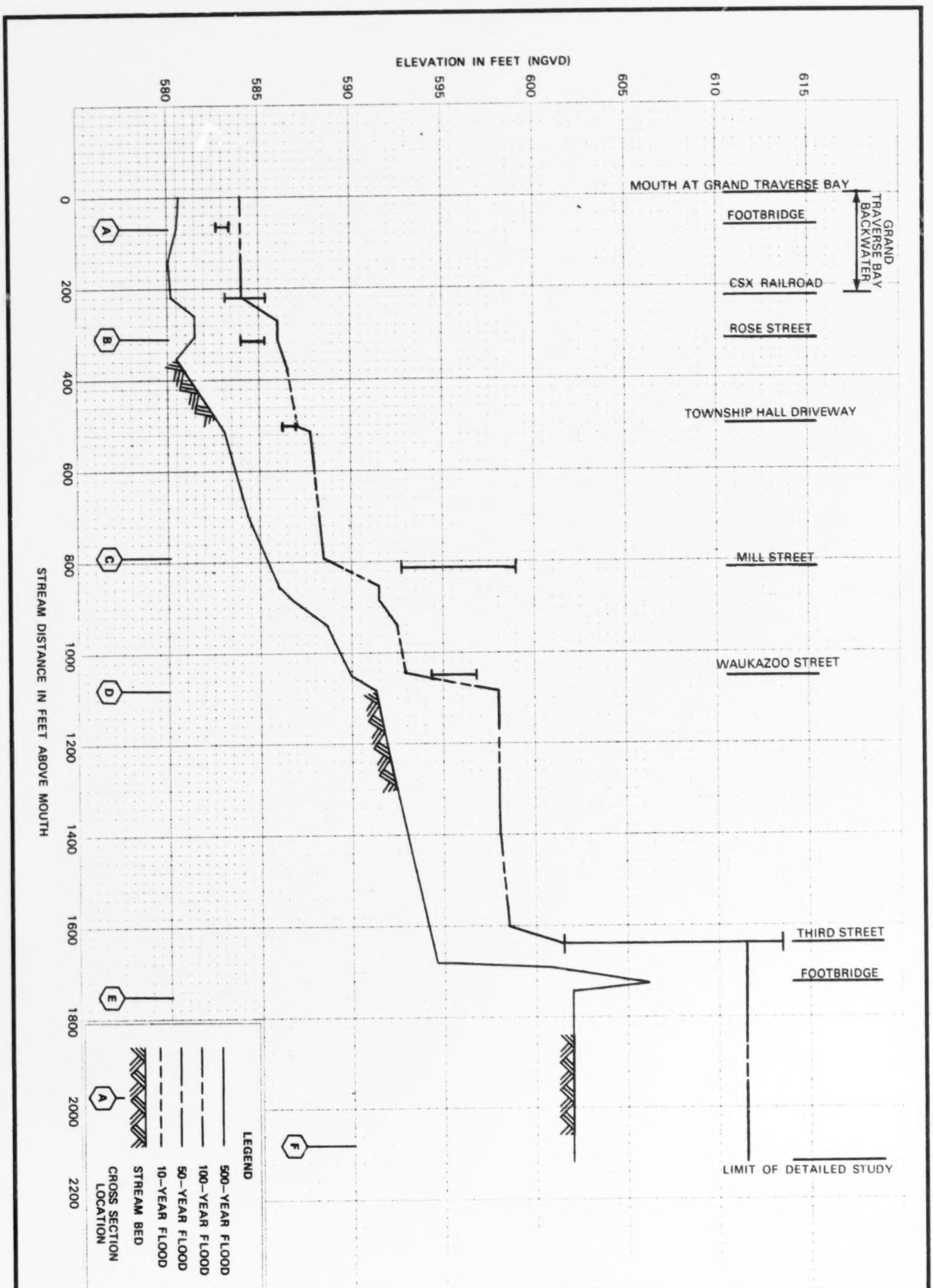
7. U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA/RD-86/108, Bridge Waterways Analysis Model: Research Report, J.O. Shearman, W.H. Kirby, V.R. Snyder, and H.N. Flippo, July 1986.

8. U.S. Army Corps of Engineers, Detroit District, Phase II Report on Great Lakes Flood Levels, Grand Traverse Bay and Little Traverse Bay, July 1981.

9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Northport, Leelanau County, Michigan, October 1977.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	585.26	bronze disk stamped "culvert 1959" set on top of concrete and masonry headwall over culvert for Northport Creek on east side of Rose Street, 62 feet southeast of intersection of Rose and Second Streets
2	0001	602.38	chiseled square on upstream landward corner of upstream left end of guardrail concrete post and bridge plate on Mill Street bridge over Northport Creek
3	0001	615.08	lag bolt in east side of utility pole no. 116 located on northwest corner of intersection of Third Street and Waukazoo Street, 1 foot above ground elevation, 60 feet southeast of Mill Pond footbridge



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FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF NORTHPORT, MI
(LEELANAU CO.)

FLOOD PROFILES

NORTHPORT CREEK